

Purdue University
Purdue e-Pubs

LARS Symposia

Laboratory for Applications of Remote Sensing

1-1-1977

A Versatile Classifier Model for Multiobservational Analysis

Philip H. Swain

Follow this and additional works at: http://docs.lib.purdue.edu/lars_symp

Swain, Philip H., "A Versatile Classifier Model for Multiobservational Analysis" (1977). *LARS Symposia*. Paper 225.
http://docs.lib.purdue.edu/lars_symp/225

This document has been made available through Purdue e-Pubs, a service of the Purdue University Libraries. Please contact epubs@purdue.edu for additional information.

Reprinted from

Symposium on

Machine Processing of

Remotely Sensed Data

June 21 - 23, 1977

The Laboratory for Applications of
Remote Sensing

Purdue University
West Lafayette
Indiana

IEEE Catalog No.
77CH1218-7 MPRSD

Copyright © 1977 IEEE
The Institute of Electrical and Electronics Engineers, Inc.

Copyright © 2004 IEEE. This material is provided with permission of the IEEE. Such permission of the IEEE does not in any way imply IEEE endorsement of any of the products or services of the Purdue Research Foundation/University. Internal or personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution must be obtained from the IEEE by writing to pubs-permissions@ieee.org.

By choosing to view this document, you agree to all provisions of the copyright laws protecting it.

A VERSATILE CLASSIFIER MODEL FOR MULTIOBSERVATIONAL ANALYSIS*

PHILIP H. SWAIN

Laboratory for Applications of Remote
Sensing and School of Electrical Engineering
Purdue University
West Lafayette, Indiana 47907

The maximum likelihood decision rule, widely applied to the analysis of multispectral remote sensing data, can be generalized to handle a broad class of problems involving multiple observations. Such problems arise, for example, when it is desired to classify a location on the ground based on multiple passes over the site (temporal context); or to incorporate data from adjacent locations in the decision process (spatial context).

The generalization is accomplished by redefining the classification objective and applying statistical decision-theoretic methods. As a simple example, if observations $X_1=X(t_1)$ and $X_2=X(t_2)$ are available from two satellite passes, then under appropriate assumptions it is possible to show that an optimal decision procedure is to classify the location into the class $\omega_2=\omega(t_2)$ for which the posterior probability $p(\omega_2|X_1, X_2)$ is maximum. The trick, however, is to express this probability in terms of quantities which it is feasible to observe or estimate.

Several applications of this classifier will be discussed together with experimental results of its use.

*This research was supported in part by
NASA Contract No. NAS9-14970.